

**Claims:**

1. A method of operating a pyrolysis heater for the pyrolysis of hydrocarbons in the production of olefins wherein said heater comprises:

- 5           a. a radiant heating zone having a bottom hearth and opposing walls;
  - b. at least one tubular heating coil for processing said hydrocarbons located in said radiant heating zone between said opposing walls;
  - 10          c. a plurality of hearth burners located on said hearth adjacent to each of said walls and directed upwardly for firing flame envelopes vertically up along said walls through said radiant heating zone; and
  - 15          d. a plurality of wall stabilizing fuel gas tips located on said walls above said hearth burners for injecting fuel gas upwardly between said walls and said flame envelopes;
- said method comprising the steps of firing said plurality of hearth burners with the combustion air and with less than the stoichiometric amount of fuel gas and injecting additional fuel gas into said radiant heating zone through said wall stabilizing fuel gas tips to thereby provide the stoichiometric quantity of fuel and thereby stage the combustion and prevent flame rollover.

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3. A method as recited in claim 1 wherein said wall stabilizing fuel gas tips and the resulting location of injecting said additional fuel gas are from 1 to 10 feet above said hearth burners.

5 4. A method as recited in claim 3 wherein said wall stabilizing fuel gas tips and the resulting location of injecting said additional fuel gas are about 3 feet above said hearth burners.

10 5. A pyrolysis heater for the pyrolysis of hydrocarbons comprising:

a. a radiant heating zone having a bottom hearth and opposing side walls;

b. at least one tubular heating coil for processing said hydrocarbons located in said radiant heating zone between said opposing walls;

15 c. a plurality of hearth burners located on said hearth adjacent to each of said walls and directed upwardly for firing vertically up along said side walls through said radiant heating zone and adapted to fire combustion air and less than the stoichiometric amount of fuel gas; and

20 d. a plurality of wall stabilizing fuel gas tips located on said walls above said hearth burners adapted to inject additional fuel gas upwardly along said walls.

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6. A pyrolysis heater as recited in claim 5 wherein said wall stabilizing fuel gas tips are from 1 to 10 feet above said hearth burners.

7. A pyrolysis heater as recited in claim 6 wherein said wall stabilizing fuel gas tips are about 3 feet above said hearth burners.